AMSI | AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

LEVEL: Year 1	CONTENT: Number & Algebra	FOCUS: Pattern
In the Classroom		
PURPOSE	- Use body, shapes and objects to make repeating patterns - Copy and continue patterns - Describe how patterns are made and how they can be continued - Use ordinal numbers to identify elements in the pattern, e.g. the 3rd counter is blue - Investigate and describe patterns formed by skip counting - Identify patterns on counting charts - Describe a repeating pattern of objects or symbols in terms of a 'number' pattern - Use symbols and numbers to record and continue repeating patterns	
WARM UP	**Watch the 1, 2, 3, Break it Down Clapping Game Video** Have students sit in the circle and join in with the patterns on the video – pause the video and ask students to name and demonstrate the pattern	
INTRODUCTION	Brief introduction to Good Mathematicians – make a list and place on the board, include teamwork, asking questions, sharing ideas, recording ideas, explaining thinking, persistence, checking work and learning from mistakes.	
EXPLICIT TEACHING & LEARNING	**Making Patterns** Give students a range of counters. Show students a pattern on the board – ask students to use materials to copy and continue the pattern to the left and to the right. Talk about the part of the pattern that repeats. This is called the unit of repeat. Provide students with a range of materials and encourage them to make and explain their own repeating patterns and record these in their books. **Challenge** Make a simple repeating pattern, R, B, R, B, etc. Ask students to describe the pattern. Introduce students that there is another way to think about this pattern. Place the pattern on top of the counting chart. Remove the Blue counters. What do students notice? The pattern R, B, R, B can also be called a 'two' pattern or skip counting be twos. Encourage students to the put their pattern on the counting charts and identify their pattern in terms of a 'number'	
DISCUSSION/KEY QUESTIONS	- Can you describe your pattern? - What did you use to create your pattern? - What is first object in your pattern? Third? Fifth? - What comes next in the pattern? - What comes before in the pattern? - What is the part of the pattern that repeats? - How could we record these patterns in our books? - Instead of using colours, how else could we record the patterns in our books?	
DELIBERATIVE PRACTICE	The focus of this activity is to discover if students can use their knowledge of repeating patterns created with objects and extend this to number patterns. It is important to remember to ask students to continue patterns to the right and left. This is important as students need to be able to count forwards and backwards.	
REFLECTION	Choose one student's pattern and place on the counting chart. Have students identify the pattern, name the part that repeats, continue the pattern to the left and to the right and point to various ordinal numbers. Now remove the final element in the repeating unit to help highlight the related skip counting pattern. Also reflect as a class on students who were a Good Mathematician and why – have students nominate one another. Remind students of list created at the beginning of the lesson.	
RESOURCES	Small Materials to make patterns (counters, shapes, etc.) – need to fit in the counting chart boxes Counting charts (1-100) A3 1, 2, 3, Break it Down Clapping Game YouTube video https://www.youtube.com/watch?v=_ICDWs7lnfI	
Curriculum Connections		
CONTENT	**NSW Syllabus Mathematics K-10 – Stage 1** **Patterns & Algebra** Investigate and describe number patterns formed by skip counting and patterns with objects (ACMNA018)	

CHOOSEMATHS

	• identify and describe patterns when skip counting forwards or backwards by ones, twos, fives and tens from any starting point • use objects to represent counting patterns (Communicating) • investigate and solve problems based on number patterns (Problem Solving) • represent number patterns on number lines and number charts • recognise, copy and continue given number patterns that increase or decrease, e.g. 1, 2, 3, 4, … 20, 18, 16, 14, … • describe how number patterns are made and how they can be continued (Communicating, Problem Solving) • create, record and describe number patterns that increase or decrease • recognise, copy and continue patterns with objects or symbols • recognise when an error occurs in a pattern and explain what is wrong (Communicating, Problem Solving) • create, record and describe patterns with objects or symbols • describe a repeating pattern of objects or symbols in terms of a 'number' pattern, e.g. ♦, O, ♦, O, ♦, O, … is a 'two' pattern ∇, ∆, O, ∇, ∆, O, … is a 'three' pattern B, B, X, B, B, X, … is a 'three' pattern • make connections between repeating patterns and counting, e.g. a 'three' pattern and skip counting by threes (Communicating, Reasoning) • model and describe 'odd' and 'even' numbers using counters paired in two rows • describe the pattern created by modelling odd and even numbers (Communicating) **Whole Numbers** Develop confidence with number sequences to 100 by ones from any starting point (ACMNA012) • read and use the **ordinal** names to at least 'thirty-first', e.g. when reading calendar dates
WHAT CAME BEFORE	Students will be familiar with creating and identifying repeating patterns with objects but may need assistance with describing their pattern and transferring this knowledge to repeating patterns with numbers.
WHAT COMES NEXT	Students will move from completed number patterns, to number patterns with missing elements. Being able to identify the 'function' or 'rule' of the pattern will be key to be able to recognise missing elements
VOCABULARY	Repeating pattern, growing pattern, next, before, after, ordinal numbers, first, second, last, copy, continue, create, explain, unit of repeat, objects, features, shapes, rule or function of the pattern (e.g. 2, 4, 6, 8 the function is add 2 or + 2), skip counting
MISCONCEPTIONS	Some students may see skip counting patterns on counting charts as growing patterns as the numbers are getting larger. The key here is the difference between the numbers is the same (or the function of the pattern is the same). Showing students the chart with all the counters on then with some removed should help to overcome this misconception.
WHAT PROFICIENCIES ARE TO BE UTILISED? **Understanding** **Fluency** **Problem Solving** **Reasoning** **Communicating (NSW)** **Justifying (NSW)**	**Year 1 (Australian Curriculum)** **Understanding** includes connecting names, numerals and quantities, and partitioning numbers in various ways **Fluency** includes readily counting number in sequences forwards and backwards, locating numbers on a line and naming the days of the week **Problem-solving** includes using materials to model authentic problems, giving and receiving directions to unfamiliar places, using familiar counting sequences to solve unfamiliar problems and discussing the reasonableness of the answer **Reasoning** includes explaining direct and indirect comparisons of length using uniform informal units, justifying representations of data and explaining patterns that have been created. **NSW Syllabus Mathematics K-10 – Stage 1 Outcomes** • describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols • uses objects, diagrams and technology to explore mathematical problems • creates, represents and continues a variety of patterns with numbers and objects
ASSESSMENT	Ask students to use symbols to record the pattern they have created into their books. Students need to identify the unit of repeat and link the object pattern to a skip counting pattern or rule/function

CHOOSEMATHS